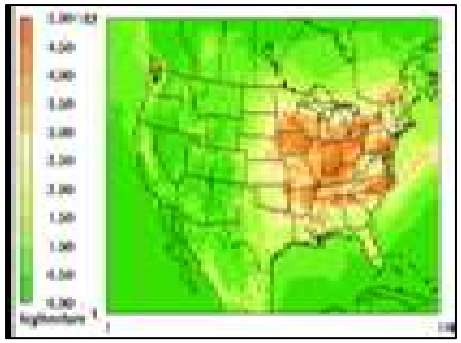
Charge to the ORD Air BOSC:

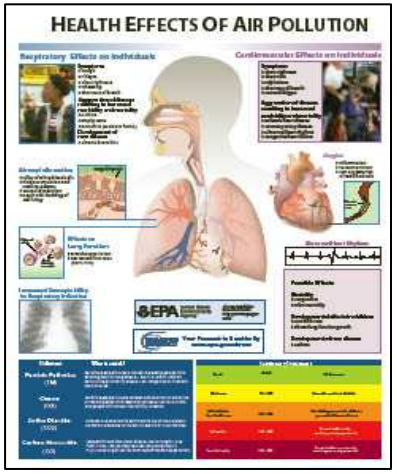
Highlights from the Roadmap



Dan Costa, Sc.D., DABT

Office of Research & Development

USEPA



What to Expect from This Point On

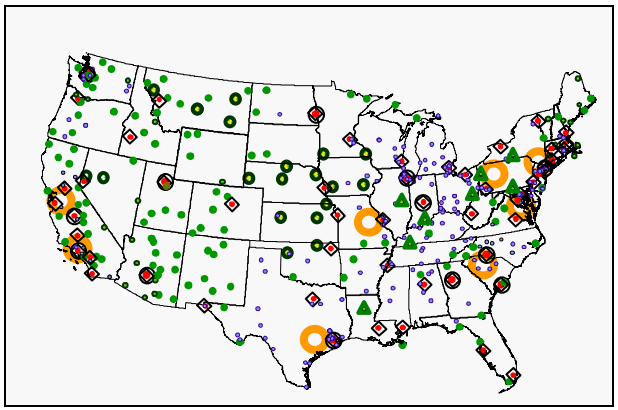
- June 1 – the Subcommittee should receive the following:
  - Bound poster books: 17x11copies of posters with associated abstracts and references for that poster on the facing page
  - Client survey synopsis with data and charts
  - Draft *Accomplishments Report 2003-2008*
- Today – 4 20 minute presentations
  - Highlights relevant to the “Charge”…Dan Costa
  - Health and Exposure…Bob Devlin
  - Air Quality…Tim Watkins
  - Source to Health Outcome: Multipollutant...Alan Vette

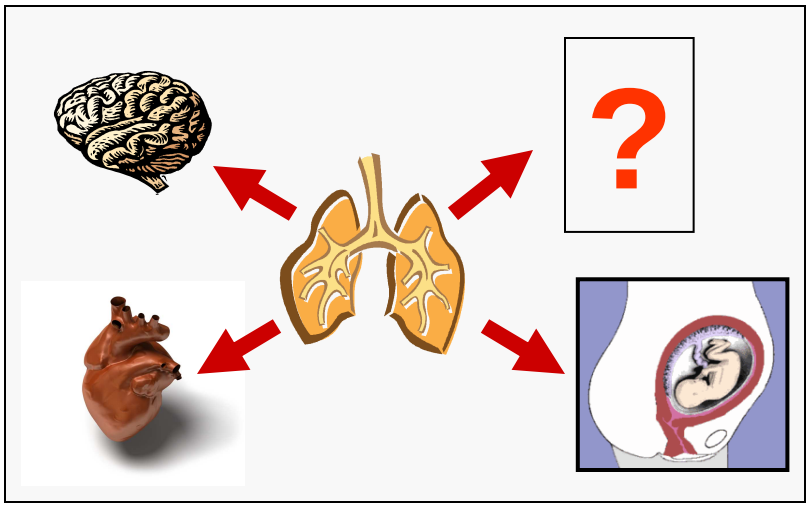
Capturing Four Years of Progress
2005 – 2009

- 'Challenges' to the Clean Air Program - multi-dimensional
  - Quickly Changing Scope – from PM/ozone to all air pollutants
  - Multi-faceted Science – integrating across many scientific disciplines, intra/extramural research
  - Multi-faceted Management
    - Science within a regulatory agency
    - Multiple clients: OAR, regions, states, fed govt, international, researchers, general public
    - Extensive Coordination
      - Other EPA research programs
      - State, federal, public/private funders

Roadmap to Address the Charge

- Much progress, many examples
  - Roadmap mailed earlier to help navigate through the notebook and CD materials
  - Meant to be Illustrative - impossible to cover everything
  - A few examples embellished here to bring program to life:
    - Priorities reflecting stakeholder needs
    - Integration of research
    - Science Quality, Management/Leveraging
    - Relevance and Outcomes





Program Design: Planning
Stakeholder Involvement - within EPA

- ORD spends a lot of time with EPA clients to set priorities
  - NPD meets regularly with OAR management and Regional representatives / convention gatherings
  - Coordination of strategic planning (e.g. Multipollutant)
  - Specially convened ORD / client groups (e.g., HEI Liaison Committee), technical committees (e.g., methods including Federal Reference Methods; atmos. modeling)
  - Survey outcomes

EPA/UNC Facility

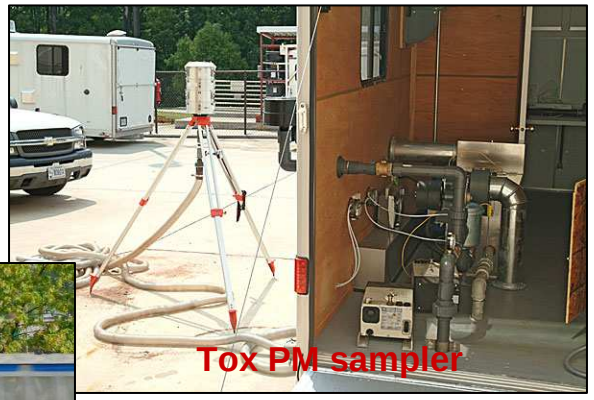
RTP Combustion Lab

Program Design: Planning
Stakeholder Involvement - within EPA (cont'd)

- Research Coordination Team (RCT) has weekly conference calls & workgroups on various levels of planning:
  - Client group which provides input and reviews of the Air Multi-Year Plan, the overall strategic direction for research
  - Participates in annual planning: priorities; emerging issues etc.
  - Members interact with individual ORD labs on progress & specific aspects of MYP implementation
  - Active participation by OAR and Regional reps in
    - Selecting STAR RFA topics
    - Writing RFAs
    - Reviewing applications that have passed peer-review to help make final grant recommendations
- Stakeholders also involved in workshops & special meetings to address topics of common interest
  - e.g., MP, AQ-Health research coordination, AQ-climate

Program Design: Planning Stakeholder Involvement – beyond EPA

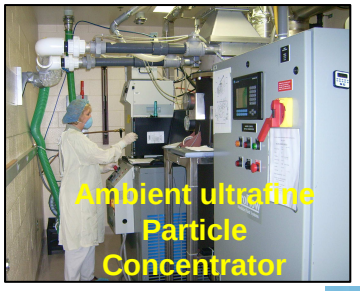
- Public Comment through the NAAQS process (e.g., resulting in $5M Coarse PM RFA)
- State and regional air pollution agencies through OAR (e.g., resulting in near road initiatives to address urgency on school siting)
- From Congress (e.g., 10 yr focus on PM, creation of PM Centers)
- From scientific community:
  - External review panels
  - Science advisory panels for grantees
  - Professional meetings

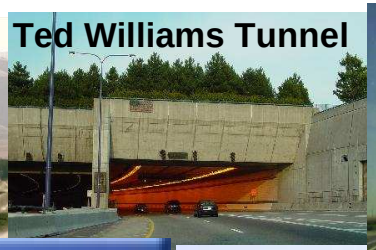

Tox PM sampler


Near School Traffic

Program Design: Integration

- **Integration on Multiple Levels Across:**
  - **Intramural Labs**
    - Combustion lab / health program
  - **Intramural and extramural**
    - PM Centers and EPA collaborate on metals analysis comparison
  - **Extramural researchers**
    - Health Effects Institute and Mickey Leland Center exposure study





Science Quality: Highlights

- Internationally renowned air pollution researchers

> "The quality of the research, as demonstrated in the bibliometric analysis, is exceptional."
> ~BOSC Midcycle review report, March 2008

- Air Program is a leader in publications [2005-09: *1,239 (1,152)]*
  - >1/3 of air publications are highly cited papers
  - 53 papers qualify as hot papers
  - 26 papers by field that meet the **top 0.1%** of highly cited papers, 10 times the expected number to meet this threshold
- Key publications, e.g.
  - New paradigm for formation of secondary organic aerosols
    - Robinson et al, *Science* 2007, 315, 1259-1262
  - Demonstrated improvement in life expectancy
    - Pope et al., *New England Journal of Medicine* 2009, 360: 376-386.
  - CMAQ Model
    - Byun, D. and Schere, K. *Applied Mechanics Reviews* 2006, 59:51-77

Science Quality: Leveraging

- Leverage across ORD research programs
  - Human Health
    - Recently awarded 8 STAR grants on air accountability research
  - Global Change Research Program
    - Focus on effects of climate change on air quality
  - Nanotechnology
    - Ultrafine research
- NRMRL combustion facility and assistance to NHEERL exposure-effect studies
- Near Road Program – cooperation with FHWA; NIEHS(?)

"These accomplishments are true documentations of the impact of the Air Research Program, the success of the MYP in addressing the Program's LTGs, and the well-integrated and cohesive benefit that this Program brings to the community."
~BOSC Midcycle report, March 2008

Science Quality: Leveraging

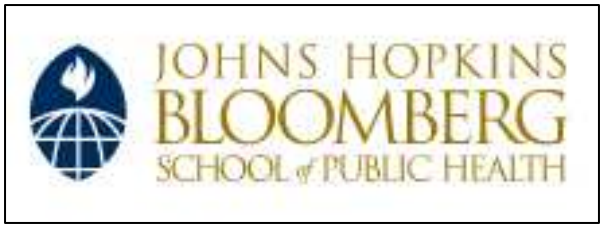
- Near roadway co-op with the University of Michigan
  - Taking advantage of EPA expertise and equipment in cities because of FHWA study
  - NPD decision to redirect funding to support health study supported by NERL / NRMRL scientists on location
  - EPA researchers will collaborate with University of Michigan scientists to study the health effects of roadway exposure to children with persistent asthma in Detroit
  - Research will provide data and tools for federal, state and local governments to make decisions about community development near roads

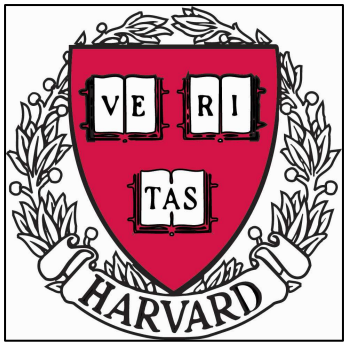
Science Quality: Leveraging (cont'd)

- Multi-Ethnic Study of Atherosclerosis-Air (MESA Air)
  - Investigating the role of long term exposure to fine particles in progression of cardiovascular disease and onset
    - More than 7000 participants in nine locations (including L.A., NYC and Chicago) in six states
  - Built on the framework of National Heart, Lung and Blood Institute's (NHLBI) ongoing MESA
    - Leverages extensive NHLBI health examinations, NHLBI oversight
    - Succeeded in involving more cardiovascular researchers in environmental health and growing the field of environmental cardiology
  - Over $6 million in ancillary studies to date/ halfway point of study

Science Quality: Leveraging (cont'd)

- PM Centers estimate over $50 million in additional grants through help from the centers' data, expertise, technology and resources.





Relevance: Decision-making & Policy Implementation

- NAAQS
  - Standard Setting
  - Implementing Standards
    - FRM, CMAQ
  - Benefits Analyses
    - Regulatory Impact Analyses
    - Office of Management & Budget
- Endangerment Finding
  - Integration with ORD's Global Change Program
- Air Toxics
  - Office of Transportation & Air Quality
- Regions
  - RARE

ORD Air research is used in virtually every facet of the review process of the NAAQS as well as in support of standard implementation.
~Lydia Wegman, OAQPS Divison Director, presentation to the SAB review committee of the PM Centers Program, 10/08

Electric Mobile Sampler

Demonstrated Outcomes

- Air pollution is not just a respiratory issue, impacts have been identified systemically – notably cardiovascular but also potentially CNS and birth outcomes
- Clinicians alerted to the risks of air pollution via the
  - American Heart Association, American Lung Association, American Association of Pediatrics, EPA AIRNow website
- CDC authors now cite air pollution as a top-6 risk factor for cardiovascular disease
- NHLBI recently contacted EPA to help assess the feasibility of an air pollution intervention study to reduce cardiovascular deaths.
- 2000 registered users of CMAS models in 90 countries

Demonstrated Outcomes

- The [PM Research] Centers have made critical advances in improving the scientific understanding of and reducing and characterizing scientific uncertainty in atmospheric particle composition, transformation, exposure, and health impacts.
  ~U.S. EPA, Science Advisory Board Advisory Panel, Jan. 2009
- Air pollution research important in OMB annual assessment of the benefits of federal regulation

According to the U.S. Office of Management and Budget in its 2007 Report to Congress on the Benefits and Costs of Federal Regulation, one rule, EPA's NAAQS for PM, accounts for 60 to 89 percent of the estimated benefits of all major Federal regulations reviewed by OMB from October 1, 1996 to September 30, 2006.